

and a Yezo Ainu, which the author considers afford important evidence in favour of the Caucasian affinities of the former race. Mr. Wallace, in opposition to the views of the late Sir William Flower, likewise advocates a Caucasian descent for the brown Polynesians. The use of the bow and arrow by the Papuans, and not by either the Australians or the Polynesians, is, he remarks, a notable ethnical fact. It clearly, indeed, serves to differentiate the Australians from the Papuans and other Melanesians; but then, on the other hand, it might also be used as an argument that the Polynesians are related to the Malays, who likewise never use the weapon in question. It may be remarked as somewhat strange that, when the author alludes to the possession of the boomerang by races other than the Australians, he omits to mention its use by certain Indian jungle tribes.

With one article on the problem of instinct, and a second on human selection, the latter worthy the best attention of those interested in the well being and improvement (both physically and morally) of the human race, the first of these two most interesting volumes is brought to close.

In the second volume our remarks, as already said, will be restricted to the first two articles, one of which deals with how an ideal zoological museum should be constructed and arranged in the best manner for educating the public, while the second discusses how near an approach to this ideal is made by the museums of the United States. The author seems to be clearly of opinion that a most important, if not, indeed, the prime function of a museum should be as an educating medium. In his main ideas he is in accord with the opinions of the late Sir William Flower, and he points out that a perfect museum ought to embrace everything from the lowest worm to the highest product of human art and skill. He also advocates the exhibition of a comparatively limited number of specimens (which should be the best that money can obtain), in order not to confuse by multitude, and also that these should have ample space. The allotment of separate chambers to particular groups is likewise made a point, because, as he urges, a long gallery only serves to distract the attention of the visitor from the objects immediately before him to those ahead, and thus inevitably leads to hurry and an imperfect study. Lastly, but not least in importance, Dr. Wallace advocates the arrangement of zoological collections according to local faunas, instead of according to the affinities of the animals themselves.

Whether or no this faunistic arrangement should be adopted for the main exhibited series in a museum may be an open question; but there can be no question at all that such an arrangement should be displayed in every national museum. The American Museum of Natural History shows in one case the animals living within a fifty-mile radius of New York, and in a second the characteristic members of the European fauna; and nothing of this nature can be of higher educational value. With regard to limiting the number of specimens exhibited, a difficulty occurs, since a museum—at any rate in England—has at least two distinct classes of visitors for whom to cater. For the ordinary lover of natural history, as well as for the general zoological student, to say nothing of “the man in the street,” a small number

of specific representatives of various groups is not only sufficient, but forms the best kind of exhibit he can be shown. On the other hand, although the working zoologist will find what he requires in the study series, the sportsman—and in Britain his name is legion—expects to find exhibited every species and race of furred and feathered game he may encounter in the course of his wanderings. To find a *via media* out of this difficulty is a problem which will probably long continue to vex the mind of the museum curator; but, like other difficulties, it will one day have to be faced and conquered.

Our best wish to the many readers whom Dr. Wallace's two volumes will undoubtedly attract is that they may derive from their perusal an amount of interest and instruction equal to that which has accrued to the present reviewer in the accomplishment of his task.

R. L.

### BRITISH BRAMBLES.

*Handbook of British Rubi.* By William Moyle Rogers, F.L.S. Pp. xiv + 111. (London: Duckworth and Co., 1900).

MR. ROGERS' “Handbook of British Rubi” is not a work likely to excite a wide interest. As the offering to his fellow “batologists” of “a diligent student of British brambles for nearly a quarter of a century,” it appeals to a restricted circle. No general worker in the field of systematic botany can hope to master the fine distinctions which discriminate the great majority of the so-called species; in fact, the general systematist will see at once that the batologist and he are widely at variance as to the limitation of species, and that for purposes of comparison with those of other genera and of a comparative study of floras the ‘species’ of British Rubi are useless. Generally speaking a ‘species’ is to some extent a personal matter, sometimes varying considerably in different conditions of one and the same person; but the entities recognised by several workers in one group usually bear an appreciable relation to each other and to those of other groups. It is not too much to say that there is no comparison whatever between the species of the batologist and the species of the botanist.

In Sir Joseph Hooker's “Student's Flora,” which we may regard as the expression of the views on the British flora of our greatest living systematist, four species of *Rubus* are recognised, namely, *R. Chamaemorus* (the cloudberry), *R. saxatilis*, a small low-growing, sub-alpine plant rare in the south and east of England; *R. Idaeus* (the raspberry), and *R. fruticosus* (the blackberry or bramble); under the last-named twenty-two forms or subspecies are enumerated. Bentham, in his “Handbook of the British Flora,” has five species, *R. caesius* (the dewberry) ranking as a species, whereas in the Student's Flora it is regarded as a subspecies of *R. fruticosus*. Babington, whose manual is generally recognised as the best critical account of our flora, and who paid some attention to the *Rubi*, makes forty-eight species by raising to specific rank a number of forms of *R. fruticosus*. Mr. Rogers, by a further elaboration of the same species, admits one hundred and three, many of which are subdivided into subspecies or varieties.

Thus *R. anglosaxonicus* has four subspecies and *R. dumetorum* eight varieties, and of the latter Mr. Rogers says,

"Other undescribed forms of this aggregate no doubt exist in Great Britain, and a further study of these may possibly justify the addition of one or more new varieties to the preceding list."

Thirteen of the species and a fair proportion of the varieties and subspecies are peculiar to the British Isles, occurring mainly in very restricted areas. *R. durescens*, for instance, is known only in Mid-Derbyshire, and *R. mercicus* is "at present known with certainty only between Water Orton and Minworth, Warwickshire."

We do not wish to underrate the value of the work of Mr. Rogers and his fellow-batologists, who, moreover, are not wholly responsible for the present state of batology. They are disciples of Dr. W. O. Focke, of Bremen, whose epoch-making visit to England in 1889 is referred to almost as the missionary visit of an apostle. The handbook is a monument of patient toil and critical examination; each species, subspecies and variety is described with a care and fulness which many botanists would do well to emulate; notes on habitat are given, the distribution, if any, on the Continent is recorded, and there are also many remarks of a critical nature on the affinities of the form in question. An appendix contains a list of the botanical counties for which each species is recorded; and the thorny path of the student is somewhat eased by a key to the groups and a brief conspectus of the species which precede the detailed descriptions.

As a study in the variation of a highly variable species, the book is a store of valuable information, which, if carefully collated and arranged, might yield results of great interest, especially if more particulars as to habitat and environment were included. However, Mr. Rogers' aim has been to record and systematise, for the benefit of students of batology, facts already ascertained, and he has carried out his task in a manner which, except for a few details, is beyond criticism, and calls for the gratitude of all batologists present and to come.

A. B. R.

#### EXPERIMENTAL FRUIT-FARMING.

*Report of the Working and Results of the Woburn Experimental Fruit Farm.* By the Duke of Bedford and Spencer U. Pickering, F.R.S. Second report. Pp. v + 260. (London: Eyre and Spottiswoode. 1900.)

**I**N few departments of plant cultivation is empiricism more rampant than in the cultivation of fruit-trees. The methods of pruning and other cultural details have been handed down from our forefathers with little or no attempt to regulate them by scientific methods, whilst, in too many instances, absolute neglect has prevailed and fruit-growing has, in consequence, been deemed unprofitable at the very time when thousands upon thousands of barrels of apples are imported annually from the United States, Canada and Tasmania. In some cases this foreign supply comes in when our own crop is exhausted, but, speaking generally, a very large proportion of the fruit crop might be grown here just as well as in the States were our farmers endowed with the same business capacities as their brethren across the Atlantic. Recog-

nising the importance of these facts, the Duke of Bedford has established near Woburn an experimental fruit-farm, where, under the directions of Mr. Pickering, experiments are being carried out on various cultural methods applied to fruit trees and to bush fruit. At the same time, demonstration plots are planted with a view of showing to the farmers what kinds of apples and other fruit trees may be grown in that particular locality with a reasonable expectation of profit.

The farm has now been established for five years. The first report, published three years ago, was naturally devoted largely to a general account of the ground and of the experiments then commenced. The present volume deals more largely with results. Those who have no leisure to investigate the statistical details will be able to glean a good general idea of their purport from the perusal of the table of contents and the general summary given in the appendix.

The experiments made with a view of destroying the currant-bud mite were very numerous and very unsatisfactory. Although at Wye College the use of hydrocyanic vapor has been found serviceable, it was found of no avail at Woburn. It would seem, however, that our efforts will be negative until we know more of the life-history of the mite. Perhaps the study of the manners and customs of the hazel-bud mite might furnish a useful clue to our knowledge of the nearly allied currant-bud mite.

Eighty-five varieties of strawberries were under observation, but it was not found possible to trace any definite connection between the amount of the crop they furnished and the meteorological phenomena to which the plants were subjected. Moreover, the results of the application of manures, artificial or natural, are stated to be "ambiguous," a fact which points to the inference that the soil is sufficiently fertile without the application of manure.

The results of pruning at various times and of different methods of performing the operation are tested by weighing a certain number of leaves from the trees, and by measuring the height and girth of the trees. From these experiments, it would seem as if further time is required to estimate the value or otherwise of the different methods of pruning. Root pruning, a practice largely adopted by gardeners to check undue luxuriance and promote fertility, is made the subject of other experiments by Mr. Pickering and his lieutenant, Mr. Castle. Although root pruning acts as a check to vegetation, it generally also results in the formation of a large quantity of fibrous roots and root-hairs, so that the absorbent power of the roots must be increased, and we might have expected the vegetation to be correspondingly enhanced. There is a little inconsistency here which we hope the Woburn experiments may ultimately clear up.

Perhaps the most striking result yet obtained is that showing the injurious effect of growing grass round the fruit trees, the injury being attributed to the increased evaporation from the soil and the consequent exposure of the trees to drought. Many of our orchards are in grass, but as they are "fed off" by sheep the injurious results may, in a measure, be counteracted by the manure so supplied. Other experiments we can not here further allude to, but, in conclusion, we can but emphasise the